

# Miles to go before we sleep: education, technology, and the changing paradigms in health information\*

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DOI: 10.3163/1536-5050.99.1.011

**Purpose:** This lecture discusses a philosophy of educating health information professionals in a rapidly changing health care and information environment.

**Discussion:** Education for health information professionals must be based upon a solid foundation of the changing paradigms and trends in health care and health information, as well as technological advances, to produce a well-prepared information workforce to meet the demands of health-related environments. Educational programs should begin

with the core principles of library and information sciences and expand in interdisciplinary collaborations. A model of the health care environment is presented to serve as a framework for developing educational programs for health information professionals.

**Conclusion:** Interdisciplinary and collaborative relationships—which merge health care, library and information sciences, and other information-related disciplines—should form the basis of education for health information professionals.

## INTRODUCTION

When I received the letter informing me that I was selected as the 2010 Janet Doe lecturer, I felt so many emotions, ranging from surprise to anxiety. After my initial reaction, I realized the great honor I had been given to share my perspective on the field of health sciences librarianship. I thank the individuals who supported my nomination as well as the Medical Library Association (MLA) for giving me this opportunity.

I clearly remember myself as a young woman who was approached by Dr. William Goffman, dean of the School of Library and Information Sciences at Case Western Reserve University (CWRU), to offer me a National Library of Medicine (NLM) fellowship to study for a master's degree in medical librarianship. I had completed a bachelor's degree in mathematics and was working on a graduate degree in the same discipline. The next day when I met with Dean Goffman, he was both surprised and annoyed that I had turned down the fellowship. It was beyond his comprehension that someone could refuse his offer. Actually, I had not applied for the fellowship, and this was not a career path that I wanted to pursue. So I thought! But he was a persistent person, and he had a plan for me. He sent me to the CWRU medical library to talk with the library director. I was fascinated, intrigued, and challenged by what I heard. I was puzzled by the number of photocopy machines and the bustling activities I saw. Those of you who remember the 1970s can relate to this. I decided then and there that I needed to know more about medical libraries. CWRU master's program in medical librar-

### Highlights

- Educational pathways for the creation of future health information professionals are charted through the discussion of four major roads.
- A model of the health care environment sets the framework for building educational programs for health information professionals.

### Implications

- The presented pathways can inform educational decision making at all levels, including the need to revisit the accreditation bodies of programs educating health information professionals.
- The National Library of Medicine is encouraged to create a workforce center to identify the needs of the profession.
- Interdisciplinary and collaborative partnerships are vital to produce quality graduates who are prepared to handle the complexities of the health care and information environment.

ianship served as a solid foundation for my future career.

It is at this stage that NLM started to play a role in my life. The partnership with NLM began when I received their master's fellowship, followed by a doctoral fellowship. A great deal of my work has been guided, inspired, and motivated by many of NLM's personnel and their endeavors as well as their leadership in informatics.

As with all previous Janet Doe lecturers, I immediately started thinking about the topic of the lecture and the message that I wanted to present. It was at last year's MLA annual meeting in Hawaii when I talked to Dr. Donald A. B. Lindberg in the halls of the convention center that I began to focus my thoughts.

\* The Janet Doe Lecture on the history or philosophy of medical librarianship, presented at MLA '10, the 110th Annual Meeting of the Medical Library Association; Washington, DC; May 24, 2010; J. Michael Homan, AHIP, FMLA, the 2009 Janet Doe lecturer, gave the introduction.

He suggested that I share Ana Cleveland's view of our profession and my perceptions of the concepts that chart the educational pathways for producing the next generation of health information professionals. Later, I shared a taxi ride with Lucretia W. McClure, AHIP, FMLA, and this proved to be beneficial and stimulating as she gave her endorsement and blessings to the topic that I had discussed earlier with Lindberg.

In 1922, Robert Frost published a poem titled "Stopping by Woods on a Snowy Evening." It is reported that it was his favorite work of the many, many poems he wrote during his career. He called it "my best bid for remembrance" [1]. Most people do not remember the entire poem, or its setting, or its background, but we recognize its most famous stanza:

The woods are lovely, dark and deep.  
But I have promises to keep,  
and miles to go before I sleep,  
and miles to go before I sleep. [2]

I would like to use the analogy of a journey down many roads. We have traveled many miles, and we have kept many promises. We still have many miles to go and many promises to be made and kept.

My theme is that education for health information professionals must be based on a solid foundation of the changing paradigms and trends in health care and health information as well as technological advances to produce a well-prepared information workforce to meet the demands of health-related environments.

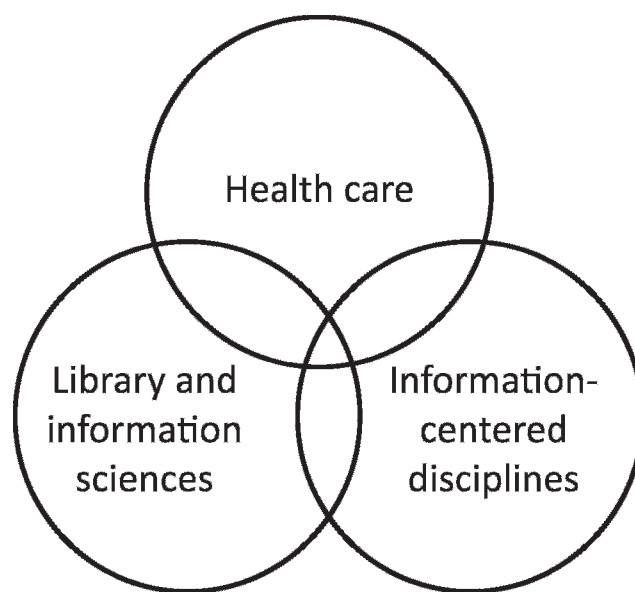
It is essential that educational programs do not abandon the basic tenets of library and information sciences—what we often call the core principles. On the other hand, we cannot lose sight of the fact that our programs require interdisciplinary and collaborative curricula that integrate the total domain of the health care enterprise, library and information sciences, and other information-centered fields. Figure 1 illustrates the three areas that need to be considered when designing interdisciplinary and collaborative curricula.

The creation of a new health information professional is the result of both intelligent design and evolution. To be successful, the process must be a collaborative effort among students, faculty, practitioners, colleagues in the health care industry, and professional associations. The praises of success or the blame for failure cannot be placed solely on one of these elements. We must reinforce existing relationships and develop strategies for new pathways. I am postulating that the education of health information professionals must begin with a clear and definite understanding of who we are and what is occurring in our domain of service.

## THE FOUR ROADS ON OUR JOURNEY

We will take a journey along educational roadways for the creation of future health information professionals. The *first road* on our journey is to reflect on

**Figure 1**  
Areas to be included in interdisciplinary and collaborative curricula



what it means to be a professional and the roles of health information professionals. The *second road* on the journey examines the current changes in health care and health information. New values and application theorems in health care are strongly affecting the structures of health information, and this, in turn, is a major part of our roadmap for planning viable and effective educational programs. The *third road* is to build a philosophical foundation of professional educational programs for health information professionals. The *fourth road*, and the last stop on our journey, is my personal philosophy of teaching.

## Road 1: The professional

The journey begins by taking "Road 1: The Professional." The first step is to consider what it means to be a professional and what are the roles of the professional. Bullock and Trombley state that a profession is "the development of formal qualifications based upon education, apprenticeship, and examination, the emergence of regulatory bodies with powers to admit and discipline members, and some degree of monopoly rights" [3].

Basically, a profession is a group of individuals who are recognized by the general public as having special knowledge, competencies, and skills based on an extensive knowledgebase, with extended education and training. The knowledgebase is dynamic, advanced by a strong, ongoing research enterprise. Wikipedia says it rather bluntly: "A profession is a group of people in an occupation who have some degree of demarcation of the qualified from unqualified amateurs" [4].

Throughout my career, I have always heard that we are "professional librarians," that the master's degree

made us a professional. I have never heard a lawyer say, "I am a professional attorney," or a doctor say, "I am a professional physician." If our actions, our services, do not speak for themselves, then neither arguments nor titles will make us professional.

According to Sparkes, one grows, learns, obtains skills and values, and gradually becomes a professional [5]. It is this individual professionalism that I am concerned with when I am involved in designing an educational program for future health information professionals. When we start to design an academic program, we must begin by asking, "Is it clear in our minds what a health information professional is?" I am reminded of the children's book character, Waldo, from the *Where's Waldo?* series. If you recall, in the books, we are challenged to find Waldo hidden somewhere in an information overload picture [6]. I do not know how many health information professionals are named Waldo, but in current times, maybe we are all Waldos, traveling many roads. Often, we address the point of what we should call ourselves in this new information milieu. We need to identify health information professionals in terms of what they do and what they will be doing in a rapidly changing information environment. As educators, we need to know *exactly* who Waldo is and where he is likely to travel.

As we try to define who we are, we can refer to seminal works on this topic in our profession. McClure reminds us that *The Handbook of Medical Library Practice* sheds light on how we have perceived ourselves for many years [7]. One approach for discovering our identity is to look at the roles that we have performed, as described in the literature over the years. An analysis gives us a broad view of the landscape of who we are and how we are constantly in an *emerging* mode.

In the 1996 Janet Doe Lecture, Braude maintained that "the basic role of health sciences librarian has not significantly changed...what has changed is the environment in which this role is carried out and the tools used to accomplish the tasks" [8]. Lynch stated that future viability of the health sciences library "depends on the ability and willingness of the library to step outside of its traditional roles and comfortable niches and to focus on larger, systemic goals and visions" [9]. Shipman said, "that technological advancements; intense research in human genomics, biotechnology and life sciences; changes in health-care provision, education, and government mandates" are defining new roles and new identities for medical librarians [10]. A common thread in these observations is that change is inevitable. There is no question that the what, when, where, and how of the information paradigms have changed and will continue to change. One thing that stands out clearly in any discussion of identity and roles is the basic underlying concepts of information and service.

Many others have written on the evolving role of the medical librarian; however, predicting what lies ahead for the medical librarian can be risky. As Lindberg and Humphreys point out: "The history of libraries, computing, and telecommunications is filled

with notoriously bad predictions" [11]. This is certainly true, but it also underscores our need to develop some continuing mechanism to study, analyze, and visualize the future.

In 1979, I had the privilege of attending the "Allerton Invitational Conference on Education for Health Sciences Librarianship." As a young and novice educator, meeting the leaders of medical librarianship was a phenomenal opportunity. Dr. Estelle Brodman asked me to join her for a walk in the parking lot. It was drizzling, a bit foggy, and I was holding the umbrella for both of us. Suddenly, eye to eye, with only the handle of the umbrella between us, she asked me what I thought of medical librarianship. It caught me by surprise. My response was candid and sincere, and then I told her that I was fascinated with the possibility of educating my students to be clinical medical librarians. Apparently, my enthusiasm was a bit too much for her. She looked into my eyes and said, "Dr. Cleveland, what is new?!" The tone of her voice gave an indication that I might be in trouble. She proceeded to tell me that hospital librarians have been providing information to doctors, residents, patients, and others in the hospital wards for a long time. She was strong and determined that I would get the point that this was a new name for a service provided by hospital librarians for years. The remainder of the walk was in silence, but as we returned to the building, she said, "Dr. Cleveland, you will be fine, don't forget who we are and what we do... it is the *how* to that changes."

Dr. Brodman's words have remained with me to this very day. Most importantly, I have consistently questioned the very nature of our existence, not in a negative sense, but in a positive way. I believe that I am a medical librarian, an information specialist, a health information specialist, and perhaps in some cases, a biomedical information specialist. At any rate, no matter what the world calls me, my domain is information. In everything that I do, I work from that premise. Along the same line, McClure expressed it this way:

if a rose by any other name is still a rose, then a librarian by any other name is still the individual who has certain and special qualities and qualifications to perform in the digital or the traditional roles of the profession. [7]

This is certainly true, but we need to remind ourselves as we look at a rose garden, there are many, many varieties of roses. New ones are being bred, and old varieties are being improved upon all the time. When we find Waldo, how do we grab him by the ears and make sure he is properly dressed and prepared for the many journeys that are ahead? We start in the academy with formal programs of education, and the challenge is to know how to design those programs.

## Road 2: Changes in health care and health information

The next road on our journey to create the future health information professional through educational

programs is to understand the environment in which the professional will work. We need to be keenly aware of current events and trends and the types of information needs that are being generated.

A number of years ago, the famous educator, Ralph W. Tyler, stated that in order to become a professional, an individual must reach a number of goals. We need to keep these goals in mind as we design our programs. Among others, he listed the following two: (1) a deep understanding of the persons to whom the professional service is rendered and (2) an understanding of the structure and functioning in which the profession operates [12]. In our discussion, the first one relates to health care personnel and the second relates to the health care system.

**A model of the health care environment.** According to Plochg, Klazinga, and Starfield, a major challenge to health care has always been the need to adjust to meet the demands of changing health in society [13]. With this in mind, we need to continually examine the health care environment. This environment is dynamic and constantly evolving but basic relational concepts have stood the test of time. The model of the health care environment that is represented in Figure 2 can be used as a guideline for developing and enhancing educational programs for health information professionals. As stated, the areas in the model are fluid over time; therefore, they have to be revisited to identify the latest developments in the health care environment.

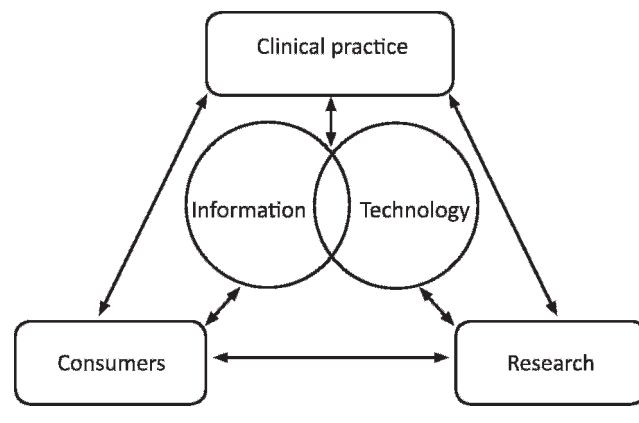
At the heart of the conceptual model are information and technology, which impact all three arenas: the clinical practice of health care, health care consumers, and research in health care. External as well as internal forces impact this model, creating changes that affect the information needs of each arena. It is vital that health information professionals and library and information sciences educators keep abreast of the changes as they evolve over time.

Figure 3 provides a snapshot of the present health care environment, including selected paradigm shifts and trends we would observe in the various areas. These factors affect information and information delivery and impact what health information professionals should know in order to provide relevant services. Here are examples of the issues we should address:

1. Are we ready to handle the information needs of the growing health care personnel population?
2. Are we ready to be active participants in the new models of health care integration?
3. Do we understand the changing demographic patterns of our health care consumers, and are we ready to handle their information needs?
4. Do we understand the new shifts in health care research, and are we ready to be proactive in meeting the needs of researchers across the globe?
5. Do we understand the impact that global access to information has on how we deliver our services?
6. Can we embrace the current technologies and use them to best meet the needs of our users while still keeping an eye on the emerging technologies?

**Figure 2**

A model of the health care environment



**Trends and paradigms in health information.** The health care environment model illustrates that information and technology are fundamental to health care. Changing health care and the advent of sophisticated information technology are impacting the way health information is generated, published, organized, accessed, communicated, shared, and used. The effect can be felt in clinical, research, and consumerism environments.

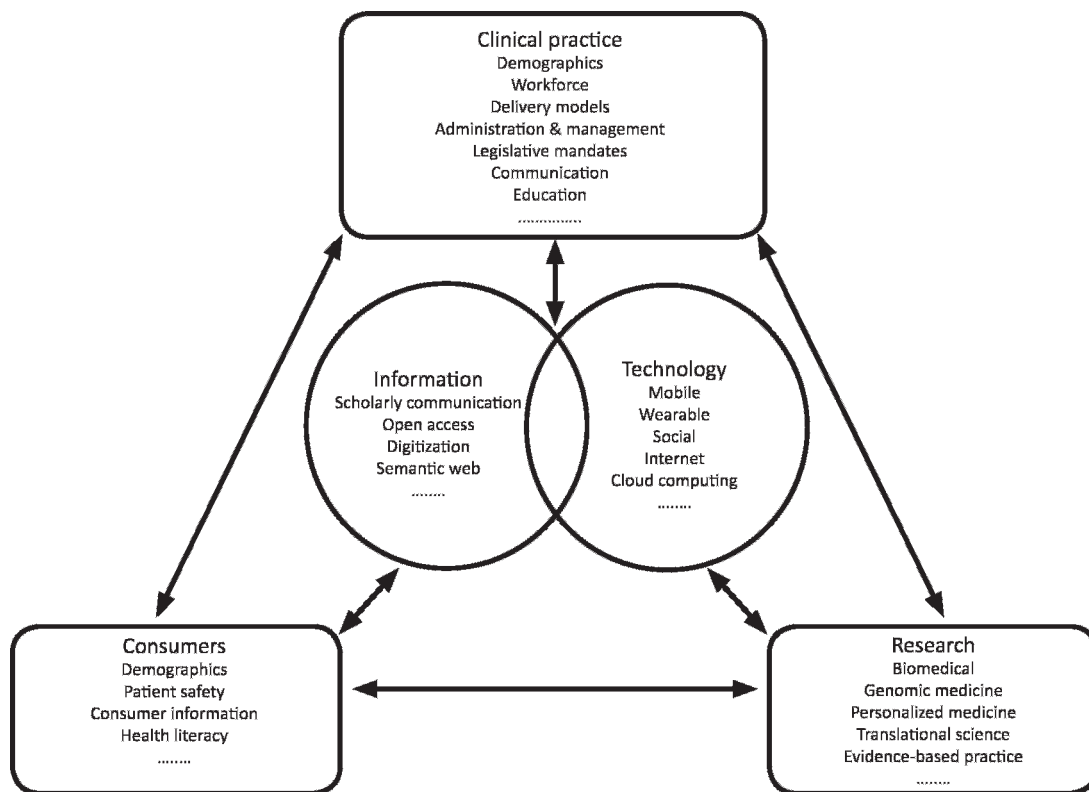
Information technology has globalized health information, making the world one gigantic database. This has considerably raised society's awareness of the power and importance of information. Health information is no longer thought of as a health care provider reading a stack of journals over the weekend. It is a living organism that guides decision making at every level of operation in health care. Resources, software, information, and devices are being shared by cloud computing platforms. Technology trends include migration to electronic records, advances in interoperability of information systems, automatic compilation of data for quality reporting, and the permeation of digitization into the information infrastructure [14–17]. There is a continued integration of information and clinical technologies and a maturing of software as a service models (SaaS).

There are new modes and methods in scholarly communication and open access channels. We want information mined and filtered to report only selected data at the point of need. New health resources are becoming available, and semantic search engines are appearing (e.g., HealthMash) to search these resources [18]. Users want personally relevant information, and they want to be connected twenty-four hours a day, seven days a week.

The Internet has revolutionized generation of knowledge and methods of distributing information. It has facilitated more rapid change in health information than any other technological advance. The amount of information on the Internet is phenomenal and is increasing at a rate beyond anyone's expectations. The challenges are that the information



**Figure 3**  
Snapshot of today's model of the health care environment



received comes from many disparate sources and needs to be aggregated so that it has some structural organization. The discovery of new knowledge keeps adding to the challenges in information management. Social media has facilitated the exchange of ideas among the scientific community, the clinical side, and the consumers, and there has been a large increase in document collaboration and repositories.

The current structure, values, sense of mission of the health care world, and the related information needs dictate the nature of the health information professional and how educational programs are designed. The new generation is often called the "immediate generation." They want information right now, everywhere they go, and they prefer that the information is condensed, sorted, and linked to an infinite number of related sources. A question to ponder: How do we design a curriculum that prepares our students to be information intermediaries in this environment?

### Road 3: Professional education programs

Once we have a clear understanding of the current structures and processes of our domain of service, that is, health care and health information, and we have identified what kind of professional we want to develop, we can turn to the task of establishing a

philosophical foundation for professional educational programs, the third road of our journey.

**Philosophy of the profession.** An educational program is built on a foundation of how we view the profession. This can be called a philosophy of the profession. Early in my career, I realized that before I could embark on creating an educational initiative, I had to develop a mental model of what is meant by professional education and the philosophical tenets of the profession.

Lemkau said that the philosophy of our profession should be to prepare for the future in the ways information is formatted, stored, communicated, and used. He stated that "the single greatest constant is change" [19]. My underlying premise here reiterates this.

My own philosophy of the profession is simple. Health is essential and crucial in the lives of people, quality information is needed for quality health care, and health sciences librarianship/informatics has the resources to contribute to the well-being of the people. From my first visit to the CWRU medical library when I saw the doctors, nurses, students, and others absorbed in the literature, I knew that I wanted to be part of the process of health care delivery. At that moment, I understood that I could have a role in patient care and in the health of the community at

large. Later as an educator, my philosophy of the profession guided my development of educational programs.

**Philosophical foundation for professional educational programs.** Professional education defines a profession's domain of knowledge on which all else is built: It is here that the basic systematic knowledge and fundamental proficiencies are instilled in the professional. The competencies and skills requirements are generally defined by the practitioners, and the necessary cognitive foundation knowledge is defined by the academic educators. This is the traditional model that has been used to develop educational programs, but the model needs to incorporate competencies, skills, and foundation knowledge outside of the realm of library and information sciences. We can turn to the information-related competencies and skills of health care professions to inform the practice of future health information professionals.

Early deliberations on finding the paths that would lead me to the right roads for discovering what is required of a new health information professional pointed me in several directions. As I started to develop a medical librarianship program and later an informatics curriculum, it was obvious that reaching out to various groups and many different sources was requisite in order to understand the needs of the profession. It was clear that I would need to travel in the company of many others on my journey.

Reaching out to health sciences librarians for a fresh, candid, and rich discussion was a natural and reasonable approach. As an example, the University of Texas Southwestern Medical Center Library in Dallas had a folder at the reference desk labeled "Ana," with a copy of the front page of new sources or notes that might be of interest to me. Now the folder is pushed to my desktop electronically. It is this type of relationship with practitioners that has been a key element to any success I might claim.

Still, there was more to be done beyond the field of library and information sciences, as I also found pathways to connect with health care providers, and eventually many of these professionals became involved directly in the program, a practice that I have maintained throughout the years. Without the support and input of medical librarians and health care professionals, we can only create idealistic educational programs in a vacuum.

The compartmentalization of knowledge is no longer educationally viable. Partnerships in developing educational programs must not be confined within our own profession. We are compelled to cultivate interdisciplinary collaborations to foster the growth of a new breed of health information professionals. The time has come for schools of library and information sciences to accept the fact that they do not own the right to be the *sole* academic unit to educate health information professionals. We have lost the proprietary right to be the only ones

responsible for the education of health information professionals.

There are strong indicators that point to the need to accept models that allow for a broader view of the education for health information professionals. The paradigm shifts and trends in health care and health information and the changes of information technologies demand crossing boundaries, creating much larger bodies of knowledge and skills for our professionals. This can bring extensive and radical ramifications for institutions of higher education.

Organizational structures in academia that have stood the test of time will need to be realigned to include programs for the education of health information professionals. We will need to see more joint faculty appointments from cross-disciplines, changes in curricular requirements, redefinition of funding formulas for personnel and credit-hour production, and a variety of degree-granting academic units, among others. The landscape of the faculties would include individuals from academic units and representatives from the health care industry, as well as other health agencies. The integration of personnel from various environments, pedagogical methods, research practices, and resources requires a change in the culture of the organization.

There is a symbiotic relationship between academia and the profession, such as in the hiring of new professionals. As we conceptualize different models of education, the profession will need to embrace the idea that not all graduates will come from the present realm of schools of library and information sciences. More libraries are hiring individuals from disciplines in the sciences and social sciences, but the majority come from our schools. Mental models of our educational programs will need to be shifted to accommodate the new breed of professionals being educated in different academic units.

We need to explore further architectures for broader collaboration that integrate knowledge and learning opportunities across schools of library and information sciences. Currently, the Web-based Information Science Education (WISE) Consortium attempts to enhance opportunities in library and information sciences education [20]. There are challenges for such an undertaking, and it will be crucial to develop strategies that could be implemented in a wider range of educational settings and would assist in reducing the disparities in today's health sciences librarianship and information sciences curricula.

The proposed changes will definitely mandate that the accreditation of our educational programs be revisited. We have learned that having a centralized organization for assessing the quality of the programs is necessary to maintain order and quality in professional education. Currently, the American Library Association is the accrediting body of programs in library and information sciences. It is time to explore other avenues to assure that standards for the education of health information professionals meet the requirements and expectations of the profession and those we serve. We should be looking at the

American Medical Informatics Association, American Medical Association, American Nursing Association, and others as potential organizations to partner with and give us direction. The benefits from such relationships can go beyond our greatest expectations. This will foster new practices in hiring faculty, designing curricula, creating collaborative research initiatives, and developing accreditation standards, and ultimately it would impact the nature and type of graduates that we produce.

I am advocating that if we have schools of library and information sciences with programs educating health information professionals, then the accreditation body of such programs should be determined by the nature of the programs. We should encourage a diversity of program offerings, driven by the creativity and innovation of the personnel involved and the commitment of the institution. At the same time, efforts should be concentrated on developing centers of specialization in specific areas of our profession, and this includes the different areas of informatics and biomedical sciences. The journey on this road will be bumpy and include some potholes and tricky intersections.

In a recent article in *Academic Medicine*, Skochelak reflected on the 100 years since the publication of the Flexner's report on the *Medical Education in the United States and Canada*. She questioned if the medical profession and the medical educators had the "wisdom and courage to support the innovations needed in the next 10 years" [21]? As I read her arguments, I considered our profession, and I concluded: yes, indeed, we do have the wisdom and the courage to move forward. We have the momentum to reach out to form new collaborative partnerships.

As educators and as practitioners, we have to accept the fact that the *perfect* preparation for professional work is not attainable. We can only strive to make the transition from the classroom to the workforce as smooth as possible. This requires partnerships, collaboration, and a bond of trust among all of us.

**Workforce center.** A retrospective look at the history of health sciences librarianship shows a continuing effort to assess the workforce of the profession. The approaches certainly have been diverse, and the purpose, scope, and degree of granularity of the studies varied, but the basic principle has remained constant, that is, to assure that the evolution of our profession charts strategic roads for the future. A number of these initiatives have been undertaken by MLA as well as others.

The quest for assessing our needs raises the question of who should be responsible for such an undertaking. Currently, we have no formal structure or tool for needs assessment that is widely used in our profession. Having a strategic plan for assessing needs can yield a wealth of data that can provide information for charting future pathways for the profession.

Creating a workforce information center seems to be long overdue. We need to have a permanent centralized mechanism for systematic collection and analysis of data providing information about the supply and demand of health information professionals, educational programs, best practices, repository of research endeavors, and job opportunities, among others. It is critical and vital at this time to have such a center. If all the predictions about the increase of health care professionals prove to be right, there will be an exponential demand for individuals who have the knowledge and skills that we can provide as health information managers. NLM has the leadership to bring such a center to reality. The National Network of Libraries of Medicine could play an active role in accomplishing the efforts of the center. Supporting such a center will be of great benefit not only to the profession as a whole and to the institutions delivering educational programs, but also on a larger scale, it could influence policy makers and other stakeholders.

#### Road 4: My teaching philosophy

The fourth and last road of the journey is to share my philosophy of teaching. Basically, "teaching is a partnership." It is the sharing of learning, exploring, and discovering together with the students that makes the teaching profession so rewarding. My teaching is based on knowledge, processes, skills, and attitude.

My goal is to create a rich learning environment in which the students will be motivated to pursue the issues presented in the classroom. I strive to prepare my students to be forward thinkers, critical thinkers, decision makers, agents of change, leaders in their organizations and in the profession, individuals who are responsive to the challenges of managing change, and finally, adopters of technological advances. I aim to share my expertise and experiences in such a way that I inspire them to work to their fullest potential. I promote networking, and I believe in mentoring even beyond completion of the academic program.

Another cornerstone of my teaching philosophy is the partnerships I develop with faculty, adjuncts, and teaching assistants. I believe in creating interdisciplinary teaching teams that integrate library and information sciences, health informatics, health care professions, and other information-related disciplines. This is the philosophy that I have used in building the University of North Texas (UNT) Health Informatics Program. Three examples of interdisciplinary teaching teams are: (1) the medical informatics course is taught by a chief information officer from a major health care system, a medical librarian, and a library and information sciences educator; (2) the community-based health information course is taught by information professionals with expertise in public health and consumer health; and (3) the medical digital imaging course is taught by the owner of a medical imaging consulting firm and an information professional who works in a hospital systems envi-

ronment. This approach to teaching has been implemented throughout the UNT Health Informatics Program, and it has proved to be successful in providing the students with a well-rounded perspective on the field of health sciences librarianship or informatics.

**Epidemic theory of spread of ideas.** Over the years, there have been a number of key experiences that impacted my philosophy of teaching. About forty years ago, I took a doctoral class from Dean Goffman, a mathematician who had received several grants from NLM and the National Science Foundation, to devise a method that was called the epidemic model for the spread of ideas. He used nonlinear differential equations from medical epidemiology to make an analogy of the spread of ideas. His projects were quasi-experimental tests on a number of large-scale bibliographies. The results showed that these models can be used to analyze the literature and predict the growth and spread of new ideas. In fact, they can predict, within probabilistic limits, the emergence of new branches of knowledge. The epidemic model is simple. In a population (N), we have a group of susceptible individuals (S), infectives (I), and removals (R), which includes people who die or are immune. The relationships can be expressed as a set of nonlinear differential equations, which can be solved to predict an epidemic and the spread of disease:

$$dS/dt = -\beta SI - \delta S + \mu$$

$$dI/dt = \beta SI - \gamma I + \nu$$

$$dR/dt = \delta S + \gamma I$$

S, I, R, “and their derivatives are continuous functions of the time parameter  $t$ . Here  $\beta$  is the rate of infection,  $\delta$  and  $\gamma$  are the respective rates at which susceptibles and infectives are removed,  $\mu$  and  $\nu$  are the respective rates at which new supplies of susceptibles and infectives enter the population” [22].

I often think of Dean Goffman when I am preparing for a course. I hope to be an infective. My population is the students enrolled in my class, and they are susceptible to my infectious ideas. A few will be immune. Hopefully, enough students will be infected to start an epidemic of ideas. This puts an instructor in a powerful and highly responsible position. We cannot lose sight of the potential impact that we may have on an individual and ultimately on the profession.

## ROADS TO BE TRAVELED AND PROMISES TO KEEP

Our journey through the educational roadways is now complete, but there are still more roads to be traveled and promises to keep. We need to chart the next phase of the journey for current and future

realities. The education of health information professionals cannot be done without the active collaboration of our fellow travelers along the journey. Sometimes, we will have to take roads that are not well traveled, but they may lead to undiscovered gems. We just have to have the courage to take these risky journeys!

Along our roads to be traveled to educate health information professionals, we need to keep promises in order to make sure that their education remains viable in a rapidly changing environment. Some promises are implied, and some are explicit. All of us must be committed to keeping these promises and making new ones as times change. This involves the library and information sciences, as well as the health care field.

■ *To the educators:* Promise to be visionary in developing innovative educational programs that embrace library and information sciences but also integrate the health care industry and other information-centered disciplines.

■ *To the practitioners:* Promise to provide active support of educational programs from recruiting to teaching to mentoring. We cannot do it without you.

■ *To the students:* Promise to be good stewards of the future of the profession.

■ *To the vendors:* Promise to engage in the educational process. You bring a needed perspective.

■ *To the health care industry:* Promise to recognize the value of information professionals in the delivery of health care.

■ *To the health-related professional associations:* Promise to reach out to us as potential partners to support health information needs.

■ *To the Medical Library Association:* Promise to continue your advocacy for the education and development of the profession as a whole.

■ *To the National Library of Medicine:* Promise to provide stronger collaborative opportunities for those educating health information professionals.

## CLOSING THOUGHTS

In conclusion, I would like to refer to the theme of this year's annual meeting, “Reflect and Connect.” It is important that we *reflect* back on my message that education for health information professionals must be based on a solid foundation of the changing paradigms and trends in health care and health information as well as technological advances to produce a well-prepared information workforce to meet the demands of health-related environments. Based on this premise, we need to *connect* health care, library and information sciences, and other information-centered disciplines.

Before ending, I would like to express my gratitude to my own professors, to the agencies and professional associations who supported my education and career, to my personal network of professionals, who many of you are in the audience. I have called upon you, time after time, and you always were willing and eager to listen and share your expertise. Last, but first



in my heart, are the hundreds and hundreds of students I had the honor to teach. Without them, I would not be here today.

Finally, health sciences librarianship is not about making a living. It is about living a life. We are finding the roads in a vastly changing information environment, and we are ready to continue the journey.

The woods are lovely, dark and deep.  
But I have promises to keep,  
and miles to go before I sleep,  
and miles to go before I sleep. [2]

## ACKNOWLEDGMENTS

I dedicate the 2010 Janet Doe Lecture to Dr. Donald B. Cleveland, who gave unwavering support, encouragement, and guidance throughout the journey of developing, delivering, and publishing the lecture. I thank Jodi L. Philbrick for her tireless assistance and Dr. Steven L. MacCall for his willingness to read the lecture and give feedback. Also, I thank my dean, Dr. Herman L. Totten, for providing support for the completion of the lecture. A final note of gratitude to my parents, Jorge Luis Diviñó and Ana Ortiz Diviñó, for the work ethic they instilled in me.

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